UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

October 21, 2013

TECHNICAL MEMORANDUM

SUBJECT: Arkwood, Inc. Superfund Site - Comments on the Conceptual Site Model and Proposed Decision Unit Plan

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TO: Stephen Tzhone
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This memorandum provides comments related to the prospective sampling design in the document entitled "Conceptual Site Model and Proposed Decision Unit Plan for the Arkwood, Inc. Site."

General Comments

1. There are several things that need to be known before a sampling design can be developed. A risk assessor needs to be involved in answering these questions.

    a. How will the data be used?
        i. Will the data be used to estimate exposure concentrations (EPC) to calculate actual risk? OR
        ii. Will the decision unit (DU) data be compared to a threshold value already determined to represent acceptable risk?
            1. This is the more desirable option from a sampling design perspective.
            2. If so, what is that threshold value?
        iii. What will be the statistical value used as the EPC?
            1. A mean for an exposure unit (EU)? OR
            2. A 95% upper confidence limit (UCL) on the mean for an EU?

    b. What is the area and depth of the EU [in terms of sq.ft. or acres (for area), and inches (for depth)]?

2. Once the above are decided, some more things need to be considered to develop the design:
    a. What is the likelihood that the results will be:
        i. much lower than the threshold,
        ii. close to the threshold, or
        iii. greater than the threshold?
            1. influences how many increments and how many replicate field incremental samples (ISs) are needed to achieve statistical goals

    b. How much dioxin concentration variability is likely present at the scale of the increments' sample support (soil mass in grams)?
        i. influences number of increments for DU sizes larger than the standard ¼- to ½-acre for which 30 increments are usually enough

    c. What is the likelihood that the data will show a normal vs. non-normal distribution?
        i. influences what type of UCL is used, which influences number of increments and number of replicate ISs needed to meet statistical goals

3. The target particle size for the soil samples needs to be decided (i.e., all particles less than 2 mm? or only a finer particle fraction?). This is determined by the exposure pathway.

4. Handling of non-detect congeners (when calculating the TEQ) needs to be agreed upon.
    a. EPA can provide an automated Excel-based calculator that aids TEQ calculation and documentation.

Specific Comments

1. The considerations above are not discussed in the CSM document, therefore the basis for developing a sampling design is currently lacking.

2. The areas of proposed DU1 and DU2 were not provided. I did coarse estimates from older maps with a scale bar in the 2012 report.

    a. DU1 is probably about 1 acre.
        i. DU1 is portrayed as "background" because it is assumed that no activities took place there. However, this land is adjacent to areas where contamination had to be excavated.
            1. Unless there is a physical barrier present, such as a wall, it would be surprising if contamination stopped abruptly at the boundary between DUs 1 and 2.
            2. Old spills of creosote or deposition of contaminated ash or soil/dust are possible, even if there is no record of it.
            3. This would create high contaminant heterogeneity, which would require more than 30 increments.

ii. Splitting DU1 into 2 DUs or 2 SUs (one adjacent to the main site, and the other at the other end) may be advantageous.
    1. DUs are the soil volume upon which a decision is made [such as an exposure unit (EU) or a remediation unit].
    2. The SU term is used when it is advantageous to split up a single DU into smaller areas. Each SU is sampled with at least 1 incremental (≥30 increments) or composite (<30 increments) sample.
        a. Large EUs may be split into SUs in order to ensure adequate increment density, or to maintain spatial information about contaminant location to inform remedial design.
        b. IS data from the SUs are combined statistically to produce the EU/DU value that is used for comparison to a threshold.
        c. Individual SUs are cleaned up ONLY if the entire DU exceeds the threshold.

iii. If the SU/DU closest to the main site exceeds the decision threshold, it can be cleaned up separately from the SU/DU farther away.

iv. The number of replicate ISs per DU need to be considered in order to serve the following purposes:
    1. Evaluating whether increment numbers were adequate;
    2. Obtaining a representative mean; or
    3. Calculating a UCL.

b. DU2 appears to be between 4 and 5 acres. This is much too large for a single DU using the default of 30 increments per DU.
    i. Strategies to split up DU2 into smaller DUs [or possibly sampling units (SUs)] need to be discussed.
    ii. The numbers of increments and replicate ISs per new DU/SU need to be considered while keeping in mind the topics under "General Comments."
    iii. There is considerable flexibility in ICS designs.

3. DU3 north ditch, about 1000 ft long. During site visit, select a 300 ft. length where the terrain is flattest and where the most percolation occurs. Stagger increments (alternate left & right sides of ditch bottom) with 1 increment per 10 ft. Sampling of the sides of the ditch should not be done. The number of replicates (if any) should be decided with justification.

4. DU4 south ditch, about 1200 ft long. As DU3.

5. DU5 berm area, probably a small area (<1/4-acre?). If so, 30 increments per IS are probably ok. The number of replicates (if any) should be decided with justification.

6. DU6 RR ditch. If small, 30 increments per IS are probably ok. The number of replicates (if any) should be decided with justification.

7. There was no discussion of sampling quality control (QC). Refer to Figure 4, page 38 of the Dioxin UFP-QAPP User Guide.

a. Adequate QC data are needed so that data analysis can determine the degree of data variability attributable to field heterogeneity, sample handling & subsampling, and the analytical instrument.
b. A laboratory must be found that has the equipment and skills to process and subsample the ISs.
c. Processing IS samples in the field is possible if the preferred lab does not have the ability to manage sampling error. This would require a properly trained field team.

8. Recommend that the Dioxin UFP-QAPP template be used to ensure that sampling and analytical method selections and respective QC are adequately planned and described.

9. A pilot project should be considered before "putting all the eggs" in 1 field mobilization basket. The pilot can "kill several birds with 1 stone"
    a. Resolve uncertainties and test critical assumptions underlying DU delineation and numbers of increments and replicates
        i. Allow refinements to the sampling design to reduce costs
        ii. For example, if it is found that concentrations are much lower or much greater than the decision threshold, the number of increments and replicates might be minimized for the main sampling event.
    b. Ensure that the field team knows how to collect field ISs correctly and institute corrective actions (if needed) for the main sampling event; and
    c. Ensure the laboratory (or field team) can process ISs and perform incremental subsampling correctly (as measured by replicate subsamples) and institute corrective actions (if needed) for the main sampling event.

[End of comments]